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THE DELETION OF *SPOROBOLUS HETEROLEPIS* (POACEAE) FROM THE TEXAS AND LOUISIANA FLORAS, AND THE ADDITION OF *SPOROBOLUS SILVEANUS* TO THE OKLAHOMA FLORA

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ABSTRACT

Sporobolus heterolepis (A. Gray) A. Gray is not present in Texas and Louisiana. Herbarium specimens from these two states identified as *S. heterolepis* are either *Sporobolus junceus* (Michx.) Kunth or *Sporobolus silveanus* Swallen. *Sporobolus silveanus* is reported new for Oklahoma from Bryan Co. A map of the southern limits of *S. heterolepis* in Arkansas and Oklahoma, and the distribution of *S. silveanus* in Texas, Louisiana, and Oklahoma are included. A key to separate these often mis-identified *Sporobolus* species and new descriptions of *S. heterolepis* and *S. silveanus* are also included.

KEY WORDS: Poaceae, *Sporobolus heterolepis*, *Sporobolus silveanus*, *Sporobolus junceus*, Texas, Louisiana, Oklahoma

INTRODUCTION

The genus *Sporobolus*, positioned in the subfamily Chloridoideae, tribe Eragrostideae, and subtribe Sporobolinae, comprises about 160 species in the tropical, and subtropical regions of both hemispheres (Clayton & Renvoize 1986). Thirty three species are reported for the United States (Kartesz &

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Kartesz 1980) and twenty three of these are listed for Texas by C. Reeder (1975) and unchanged in Hatch *et al.* (1990). Allen (1992) reports twelve species for Louisiana. *Sporobolus heterolepis* (A. Gray) A. Gray is included for both Texas and Louisiana. The scope of this paper is to demonstrate that the inclusion of *S. heterolepis* for Texas and Louisiana is based on mis-identified herbarium specimens of either *Sporobolus junceus* (Michx.) Kunth or *Sporobolus silveanus* Swallen. Therefore, *S. heterolepis* should be deleted from the Texas and Louisiana floras. *Sporobolus silveanus* should be added to the Oklahoma flora from a collection in Bryan County mis-identified as *S. heterolepis*.

MATERIALS AND METHODS

Specimens were examined from the following herbaria (acronyms follow Holmgren *et al.* 1990) with the number of specimens examined from each herbarium in parentheses: ASTC (5), BRIT/SMU (19), LAF (2), LSU (1), NCU (2), NLU (4), OKL (4), OKLA (7), SBSC (17), TEX-LL (12), TAES (9), and US (5). During the earlier stages of this study, it was believed that *Sporobolus heterolepis* and *S. silveanus* could be separated only by a statistical analysis of spikelets traits. Therefore, measurements were made on the lengths of the lemma and glumes of *S. heterolepis* and *S. silveanus*. The mean and standard deviation were calculated and the difference between these means analyzed with a two-tailed *t* test at the 95% confidence limit. But as the study progressed, many non-statistical traits were found to be more useful. The two letter state acronyms are from the U.S. Postal Service.

DISCUSSION

Thieret (1969) first reported *Sporobolus heterolepis* new to Louisiana from Calcasieu Parish based upon his collection *Thieret 27977*. Although he offered no reason for his determination, he did provide an important observation that this specimen possessed brownish purple panicles and not the gray or lead color mentioned by Hitchcock (1950, *sic*). In 1971 Thieret annotated a 1940 collection from Allen Parish (*Brown 5717*, LSU) also as *S. heterolepis*. These two collections are the sole documentation for the inclusion of *S. heterolepis* for Louisiana (Allen 1992). Both specimens are *S. silveanus* with somewhat shorter inflorescence branches.

These two Louisiana collections (*Thieret 27977* and *Brown 5717*) have the following *Sporobolus silveanus* traits: purple or purple-tinged spikelets; lemmas longer than 2nd glume, longer than 4 mm with some ca. 5 mm long; a non-subulate 1st glume; and entire or minutely serrate blade margins. The primary panicle branches of both specimens are somewhat shorter than is typical for

S. silveanus, especially the Allen Parish collection where many of the panicle branches are no longer than 3 cm. These short branches may have accounted for their mis-identification as *S. heterolepis*. *Sporobolus heterolepis* usually has shorter primary panicle branches than those of *S. silveanus*.

Hitchcock (1935) was among the first to report *Sporobolus heterolepis* in Texas and because of his professional stature, it has been included in the Texas flora by subsequent authors. However, it should be kept in mind that the closely related *S. silveanus* was not described until 1941 and thus many of the pre 1941 collections of *S. silveanus* were mis-identified as *S. heterolepis*. The 1935 Hitchcock report was based, at least in part, on these early Texas collections at US identified as *S. heterolepis*: *Hosterman & Solomon 2267* from Paris, Lamar Co., 1941; *Tharp 2064* from Paris, Lamar Co., 1923; and *Reverchon 3484* from Wills Point, Van Zandt Co., 1903 which are all *S. silveanus*. A 19th century collection (*Neally s.n.*) from College Station, Brazos Co. is *S. junceus*. The two early collections from Lamar Co. are of significance because Riskind (1978) mistakenly reported *S. silveanus* new to Lamar Co. without being aware that it had been collected, probably at the "Tridens Prairie" site, first in 1923 and later in 1941.

The following four collections from Texas herbaria are identified as *Sporobolus heterolepis*: *Shinners 10239*, Rains Co. (BRIT/SMU); *Parks & Cory 10832*, Newton Co. (TAES); *Parks & Cory 10148*, Walker Co. (TAES); *Gould 5385*, Robertson Co. (TEX). The former two are *S. silveanus* and the latter two are *S. junceus*. These four collections are probably the basis, at least in part, for the report of *S. heterolepis* from vegetational regions 1 and 3 by Reeder (1975) and Hatch *et al.* (1990).

At OKLA is a 1953 collection of *Sporobolus silveanus* from Bryan Co., Oklahoma. The specimen was collected as *S. heterolepis* and annotated the same in 1975. This plant differs in no way from *S. silveanus* in Texas and Louisiana, and is only the second collection to have mature fruits. This is the first report of *S. silveanus* in Oklahoma and is mapped as *S. heterolepis* by the Great Plains Flora Association (1977). The populations of *S. silveanus* in Van Zandt, Lamar, and Rains cos., Texas, and Bryan Co., Oklahoma are slightly geographically isolated from those of southeast Texas and western Louisiana.

In summary, there are no specimens in the consulted herbaria to support the inclusion of *Sporobolus heterolepis* for Texas or Louisiana. The nearest documented locations for *S. heterolepis* are two counties in northern Oklahoma and four counties in northern Arkansas (fig. 1). It is unlikely that *S. heterolepis* occurs much farther south.

Table 1 is a summary of the most salient character states of the three *Sporobolus* taxa.

TAXONOMY

A key To *Sporobolus silveanus* and two other *Sporobolus* frequently misdetermined as it.

1. Most primary panicle branches in distinct verticels; verticels 5 or more per inflorescence axis, most verticels with 5 or more branches; spikelets usually less than 3.5 mm long. ..... *S. junceus*

1. Most primary panicle branches not in distinct verticels; verticels 3 or less per inflorescence axis, verticels with 4 or less branches; spikelets usually more than 3.5 mm long.

   2. Most lemmas shorter than 4.0 mm, $\leq$ 2nd glume; primary panicle branches usually shorter than 5 cm; 1st glume usually subulate above an expanded base; blade margin obviously serrate, teeth 0.1-0.2 mm long as measured along the longer side; lemmas gray to black-tinged or pale; mature caryopsis globose. ..... *S. heterolepis*

   2. Most lemmas longer than 4.0 mm, $\geq$ 2nd glume; primary panicle branches usually longer than 5 cm; 1st glume merely acute or acuminate at tip of longer wider base; blade margins entire or obscurely serrate, teeth less than 0.1 mm long as measured along the the longer side; lemmas purple or purple tinged; mature caryopsis obovate, laterally flattened. ..... *S. silveanus*

Sporobolus silveanus Swallen, J. Wash. Acad. Sci. 31:350. fig. 3. 1941. SILVEANUS DROPSEED. TYPE: UNITED STATES. Texas: open woods about 10 miles northeast of Orange, 1940, *W.A. Silveus 6441* (HOLOTYPE: NA 98476). Not at NA for P.M. Mazzeo (NA) writes that all of the type specimens housed at NA were transferred to US many years ago. Accordingly, the type specimen should be at US.

Plants densely caespitose perennials. Culms terete, 25-147 cm tall, minutely pubescent above and in the inflorescence (sometimes pubescent only in the inflorescence). Leaf sheaths longer than the internodes, the lower glabrous or pubescent with trichomes to 2 mm long, usually purple, upper sheaths glabrous, with purplish to pale scarious margins; collar margins usually with trichomes to 4 mm long, the dorsal surface glabrous. Leaf blades flat, folded or

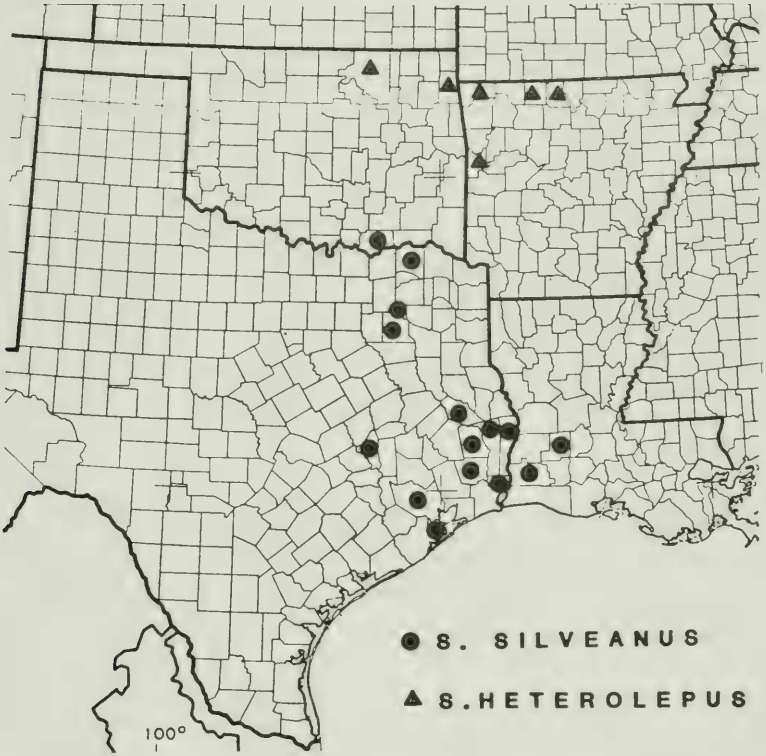

Fig. 1. Documented distribution of *Sporobolus silveanus* and *S. heterolepis* in Oklahoma, Texas, and Louisiana. The distribution in Arkansas from Smith (1988).

TABLE 1. SALIENT CHARACTER STATES OF *Sporobolus heterolepis*, *S. silveanus*, and *S. junceus*.

Feature	Taxon		
	heterolepis	*silveanus*	*junceus*
verticel number per infl-axis	0-3	0-3	5 or more
primary branch length (in cm)	0.5-5.0	(2-)5-16	to 5
spikelet pedicel length (in mm)	1-4 (mostly <4)	1.5-12 (mostly >4)	0.2-2.0 (mostly <1)
1st glume length (in mm)	1.5-4.1(-4.5) $\mu = 2.8 \pm 0.6$	2.7-4.5 $\mu = 3.5 \pm 0.5$	to 2.7
1st glume shape	mostly subulate above an expanded base	acute or acuminate at tip of a longer wider base	acute
2nd glume length (in mm)	3.1-4.8(-6) $\mu = 3.9 \pm 0.5$	3.8-5.9 $\mu = 4.7 \pm 0.5$	to 3.6
lemma/2nd glume	lemma $\leq$ 2nd glume	lemma $\geq$ 2nd glume	lemma $\leq$ glume
lemma length (in mm)	2.8-3.5(-4.0) $\mu = 3.0 \pm .2$	(3.9-)4.0-6.4 $\mu = 4.5 \pm 0.5$	to 3.5
lemma color	gray or gray to black-tinged	purple to pale	dark purple to yellowish
blade margin	serrate, teeth 0.1-0.2 mm long	entire or minutely serrate, teeth < 0.1 mm long	entire
caryopsis	globose to 2 mm wide and long	obovate, laterally compressed, to 2.6 mm long and 1 mm wide	elliptic, laterally compressed to 1.5 mm wide and 2 mm long

involute, straight or arcuate, to 62 cm long and 2.5 mm wide, the tip usually not reaching the inflorescence, the margins minutely scabrous; ligules a basal membrane with a fringe of trichomes, the upper about 0.2 mm long, the lower about 0.5 mm long. Inflorescence 9-33 cm long, usually an open panicle of purple spikelets, primary branches (2-)5-16 cm long, the upper branches more or less alternate, the lower often somewhat approximate and appearing to be in 1 or 2 verticels. Spikelets purple, pedicels 1.5-12 mm long (mostly longer than 4 mm), florets longer than glumes; glumes persistent, acuminate, the 1st glume 1-veined, 2.7-4.5 mm long, often minutely scabrous on distal portion of keel, the 2nd glume 3.8-5.9 mm long, more or less rounded on back, often 3 veins visible (one the prominent midrib vein the others formed by 2 smaller veins); lemmas (3.9-)4.0-6.4 mm long, acute, 1-veined, purple; palea subequal to lemma, 2-veined with a thin fragile groove between the ridges formed by the veins, at caryopsis maturity this fragile groove may split; caryopsis (only noted in one collection from Lamar Co., Texas and the one from Bryan Co., Oklahoma) obovate, laterally compressed, about 2.6 mm long, 1 mm wide, and 0.8 mm thick, embryo about two-thirds as long as endosperm. Chromosome number not reported.

Distribution (fig. 1). 12 counties in east TX (regions 1, 2, 3, & 4), two LA parishes (Calcasieu and Allen), and Bryan Co., OK.

Specimens examined: Louisiana: Allen Parish: longleaf pine woods, W of Kinder, 20 Oct 1940, *Brown et al. 5717* (LSU). Calcasieu Parish: longleaf pine woods, sect. 26, ca. 7.5 mi N of Starks, 26 Oct 1969, *Thieret 31899* (LAF); prairie strip along RR in sect. 6, 4 mi NE of Vinton, 24 Sep 1967, *Thieret 27977* (BRIT/SMU,LAF); sandy soil in field on W side of hwy 109, 4.5 mi S of intersection with hwy 12 in Starks, 14 Oct 1990, *Brown 14921* (LSU,NLU,SBSC). Oklahoma: Bryan Co.: prairie near Durant, 21 Oct 1953, *Jessee s.n.* (OKLA). Texas: Angelina Co.: longleaf pine uplands of the proposed Graham Creek Wilderness, 8.8 mi S of Zavalla on U.S. 69 and E on FR 314, 22 Sep 1979, *Nixon & Ward 9659* (ASTC); Brazos Co.: along hwy 6, 12 mi S of College Station, 8 Oct 1969, *Lonard 2504* (TAES); Galveston Co.: on 14th St. one block W of Ave I (FM 517), 19 Sep 1974, *Waller & Bauml 3128* (TAES,TEX,SBSC). Hardin Co.: pine forest border, 6 mi SW of Kountze, 15 Oct 1964, *Gould 11028* (BRIT/SMU,TAES,TEX); along a gravel rd W of hwy 320 S of Kountze in the Lance Rossier Unit of the Big Thicket Biological Preserve, 13 Oct 1990, *Brown 14907* (SBSC,TAES). Harris Co.: Red Bluff Rd, 1.5 mi W of SH 146, NW of Seabrook, 18 Sep 1974, *Waller & Bauml 3128* (TAES,TEX); on sandy bluff overlooking Mud Lake near the Johnson Space Center, 15 Oct 1983, *Brown 6723* (SBSC,TAES); on sandy soil at intersection of Port & Todville Rds N of Seabrook, 4 Oct 1986, *Brown 10704* (SBSC). Jasper Co.: SE of Zavalla on U.S. 63, 1.6 mi SE of the Plum Ridge Rd, 29 Aug 1978, *Marietta & Nixon 486* (ASTC,TEX). Newton Co.: 16 mi N of Newton, 11 Oct 1934, *Parks & Cory 10832* (TAES). Lamar Co.: "Tridens Prairie" 7

mi W of Paris at intersection of hwy 82 and FR 32, Nov 1971, *Collins s.n.* (TAES,TEX); hay meadow, Paris, 20 Aug 1941, *Hosterman & Solomon 2267* (US); prairie, Paris, 9 Nov 1923, *Tharp 2064* (US). Rains Co.: in fine sandy clay between RR and hwy, 3.5 mi NW of Point, 12 Sep 1948, *Shinners 10239* (BRIT/SMU). Tyler Co.: longleaf pine-grassland, 6.5 mi E of Chester on rte 1745 then left 3 mi to xeric Oligocene outcrop, 19 Oct 1967, *Correll 35172* (LL). Van Zandt Co.: sands, Wills Point, 15 Oct 1903, *Reverchon 3484* (US); Without location or date but with Texas handwritten later on label, *Reverchon 2460* (US).

Sporobolus heterolepis (A. Gray) A. Gray, *Man.* 576. 1848. PRAIRIE DROPSEED. TYPE: UNITED STATES. New York: Watertown, *Crawe s.n.* (HOLOTYPE: NY; Microfiche: NCU!). BASIONYM: *Vilfa heterolepis* A. Gray, Ann. Lyc. N.Y. 2:233. 1835. *Agrostis heterolepis* A. Gray *in* Wood, *Class-book*, ed. 2. 598. 1847.

Plants densely caespitose perennials. Culms terete to 108 cm tall, glabrous above and below (sometimes minutely scabrous in the inflorescence). Leaf sheaths longer than internodes, pale or purple-tinged, the lower glabrous or pubescent with trichomes to 1.5 mm long, the upper glabrous; margins scarious, pale; collar margins glabrous or pubescent with trichomes to 3 mm long, the dorsal surface glabrous. Leaf blades 2.5 mm wide (measured flat) and to 60 cm long, folded along the midrib with the lateral margins appressed (rarely involute), margins distinctly scabrous; ligules about 0.3 mm long, a membrane with a fringe of cilia, the upper and lower equal in length. Inflorescence 5-16 cm long, more or less an open panicle; primary branches 0.5-5.0 cm long, these alternate or approximate and then appearing to be in 1 or more verticels. Spikelets gray, gray or black-tinged when mostly pale; pedicels 1-4 mm long (mostly shorter than 4 mm); florets shorter than or equal to glumes; glumes persistent, the 1st 0-1 veined, 1.5-4.1(-4.5) mm long, subulate beyond an expanded base, scabrous on margins and distal portion of keel; the 2nd acuminate, 3.1-4.8(-6.0) mm long, rounded on back, often 3 veins visible (formed from the prominent midrib vein and 2 faint veins); lemmas 2.8-3.5 (-4.0) mm long, acute, 1-veined; paleas usually slightly longer than lemmas, 2-veined with a thin fragile groove between the veins, the mature caryopsis separating the palea into 2 halves down the groove; caryopsis globose, to 2 mm long and wide, the style base remaining as an apiculus, the embryo obscure. Chromosome number, $2n = 72$.

Distribution. A species of the prairie states and on soils of an alkaline nature east of the prairies. Reported from the following states: NY, PA, MD, OH, IN, MI, IL, MN, IA, MO, AR, OK, KS, NC, GA, NE, SD, ND, WY, and CO. Also present in southern Canada from Quebec west to Saskatchewan.

In the U.S. very rare east of IL and isolated in the southern Appalachians in Clay Co., NC and Catoosa Co., GA. The two collections in the southern Appalachians are similar to those of the prairie states. It was recently found on serpentine soils in Cecil Co., MD (Tyndall & Farr 1990).

Specimens examined: UNITED STATES. Arkansas: Sebastian Co.: Massard prairie, 25 Aug 1940, *Armstrong 223* (TEX). Colorado: El Paso Co.: on prairies, Black Forest, 6 Aug 1937, *Silveus 2036* (BRIT/SMU,TEX); low places, Black Forest, 25 Aug 1935, *Silveus A-14* (TAES). Jefferson Co.: gravelly soil of hwy right-of-way in Rocky Flats between Marshall & Coal Creek, 19 Sep 1979, *Weber 15537* (NLU,TEX). Georgia: Catoosa Co.: in thin soil over limestone rock, near intermittent stream, Chickamauga & Chattanooga National Military Park, 10 mi W of Ringgold, 9 Aug 1948, *Cronquist 5621* (BRIT/SMU). Illinois: Coles Co.: prairie area at edge of RR, 3 mi W of Mattoon, 26 Sep 1974, *Ebinger 15165* (NLU). Lake Co.: marshy flat W of dunes, Dune State Park N of Waukegan, 3 Oct 1945, *Steyermark & Barkley 15327* (TEX). Winnebago Co.: gravel prairie, N of sanitary district and S of Rockford, 8 Sep 1956, *Fell 56-363* (TAES). Indiana: Benton Co.: in prairie soil along the Big Four RR, 1.5 mi NW of Fowler, 26 Sep 1945, *Kriebel 10682* (BRIT/SMU). Newton Co.: along the Pennsylvania RR, 0.5 mi W of Goodland, 5 Sep 1938, *Kriebel 5758* (NLU). Iowa: Boone Co.: edge of U.S. 30 next to C & NW RR, Des Moines Twp, SE 1/4 sect. 25, 5 Oct 1953, *Elder 473* (BRIT/SMU, OKLA). Dickinson Co.: gravel knob, NE 1/4 sect. 13, Diamond Lake Twp. (T100N, R37W), 15 Aug 1953, *Thorne 13415* (BRIT/SMU). Story Co.: prairie at Ames High School in Ames, 2 Oct 1965, *Weyland 1008* (ASTC,NLU). O'Brien Co.: prairie covered hills along Henrly Creek, sect. 24, Waterman Twp., *Hayden 8112*, 14 Sep 1940 (TEX). Minnesota: Morrison Co.: growing in prairie strip 3 mi S of Little Falls, 2 Aug 1946, *Huff 18917* (BRIT/SMU). Norman Co.: in prairie remnant near Minn. Rte. 113, 3.5 mi E, 0.3 mi N of Syre, 27 July 1977, *Ownbey 5722* (NCU). Missouri: Greene Co.: dry rocky ground, border of woods, 6 mi S of Brighton, 18 Sep 1957, *Palmer 66656* (BRIT/SMU). Polk Co.: rocky open ground along Pomme de Terre River, 5 mi SW of Huron, 21 Aug 1956, *Palmer 63826* (NLU). Nebraska: Lancaster Co.: mowed prairie, 3.5 mi N of Lincoln, 17 Aug 1949, *Dale 1699* (TEX). North Carolina: Clay Co.: open pitch pine woods on west slope of Buck Creek, serpentinized-olivine barrens, 1 km N of U.S. 64 on Buck Creek Rd, elevation 1000 m, 11 Oct 1975, *Pittillo 6262* (OKLA,NCU). Oklahoma: Delaware Co.: prairie area, 3 mi E & 3 N of Grove on State 10, *Wallis 5942* (BRIT/SMU,OKL,OKLA). Osage Co.: 15 mi NE of Pawhuska, 7 Sep 1937, *Engleman 314* (OKL); 15 mi NE of Pawhuska, 11 Sep 1937, *Engleman 321* (OKL); Barnsdall, 14 Oct 1925, *Featherly s.n.* (BRIT/SMU,OKL,OKLA). Wisconsin: Chippewa Co.: C. St. P.M. & O RR right-of-way along hwy 12, SW corner of county, 14 Oct 1939, *Fassett & Shinners 20311* (BRIT/SMU). Dane Co.: dry sandy ground, Wisconsin River 5 mi NE of Mazomanie, 29 Sep 1940,

Greene & Shinners 3465 (BRIT/SMU); La Crosse Co.: steep, south-facing prairie on top of Grandad Bluff, 18 Aug 1956, *Hartley 2425* (BRIT/SMU). Walworth Co.: along right-of-way of Milwaukee Rd W of Delavan, 1 Aug 1936, *Wadmond 722* (TEX).

CANADA. Manitoba: in gravel till of cleared area, indian cemetery, N side of Clear Lake off of Lake Audy Road in Riding Mountain National Park, 13 Aug 1979, *Cody 24634* (OKLA). Saskatchewan: dry prairie near base of hill, McKague, 23 July 1939, *Breitung 318* (TEX); several tufts on dry sandy prairie, McKague, 8 Aug 1943, *Breitung 1717* (BRIT/SMU).

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